We Claim:

1. An atomic layer deposition apparatus comprising:

a process reactor chamber having at least one inlet and at least one outlet,

a first auxiliary chamber for receiving a first precursor gas coupled to the process reactor chamber through a first flow path,

at least one first precursor gas valve in the first flow path between an inlet of the process reactor chamber and the first auxiliary chamber,

a second auxiliary chamber for receiving a second precursor gas coupled to the process reactor chamber through a second flow path,

at least one second precursor gas valve in the second flow path between an inlet of the process reactor chamber and the second auxiliary chamber, and

an exhaust pump coupled to the at least one outlet of the process reactor chamber, wherein a mass flow controller is absent from the first flow path and second flow path.

2. An atomic layer deposition apparatus according to claim 1 wherein the first auxiliary chamber is coupled to a first precursor gas supply and the second auxiliary chamber is coupled to a second precursor gas supply.

3. An atomic layer deposition apparatus according to claim 2 wherein the first precursor gas supply and the second precursor gas supply are the same or different and are

obtained from a source selected from the group consisting of a pressurized gas tank and a heated chamber.

4. An atomic layer deposition apparatus according to claim 1 wherein the process reactor chamber includes a substrate holder.

5. An atomic layer deposition apparatus in accordance with claim 1 further comprising a valve in between the outlet of the process reactor chamber and the exhaust pump.

6. An atomic layer deposition apparatus in accordance with claim 1 further comprising a third auxiliary chamber for receiving a purge gas, the third auxiliary chamber coupled to the process reactor chamber.

7. An atomic layer deposition apparatus in accordance with claim 1 wherein the third auxiliary chamber is coupled to a purge gas supply.

8. An atomic layer deposition apparatus in accordance with claim 7 further comprising a valve in between the third auxiliary chamber and the process reactor chamber.

9. An atomic layer deposition apparatus in accordance with claim 3 wherein the first precursor gas supply comprises titaniumtetrachloride.

10. An atomic layer deposition apparatus in accordance with claim 3 wherein the second precursor gas supply comprises ammonia.

11. A method of delivering precursor gas comprising:

closing a first precursor gas valve located in between a first auxiliary chamber and an inlet of a process reactor chamber,

closing a second precursor gas valve located in between a second auxiliary chamber and an inlet of the process reactor chamber,

reducing the pressure in the process reactor chamber,

opening the first precursor gas valve,

allowing a first precursor gas to flow from the first auxiliary chamber to an inlet of the process reactor chamber solely under a pressure gradient,

closing the first precursor gas valve,

reducing the pressure in the process reactor chamber,

opening the second precursor gas valve,

allowing a second precursor gas to flow from the second auxiliary chamber to an inlet of the process reactor chamber solely under a pressure gradient, and closing the second precursor gas valve.

12. A method of delivering precursor gas according to claim 11 further comprising purging the process reactor chamber with an inert gas, and reducing the pressure in the process reactor chamber prior to opening the second precursor gas valve.

13. A method of delivering precursor gas according to claim 12 further comprising purging the process reactor chamber with an inert gas, and reducing the pressure in the process reactor chamber prior to opening the first precursor gas value.

14. A method of delivering precursor gas according to claim 11 wherein the first precursor gas is selected from the group consisting of $Zr(OC_4H_9)_4$, $ZrCl_4$, $HfCl_4$, $Hf(N(CH_3)_2)_4$, $Hf(N(CH_2CH_3)_2)_4$, $Hf(N(CH_3C_2H_5))_4$, $Y(thd)_3$, $Al(CH_3)_3$, DMAH-EPP, TDMAT, $TiCl_4$, $Ti(OCH(CH_3)_2))_4$, $TaCl_5$, $Ta(OC_2H_5)_5$, $Sr(C_5iPr_3H_2)_2$ and Zn $(CH_2CH_3)_2$.

15. A method of delivering precursor gas according to claim 11 wherein the second precursor gas is selected from the group consisting of NH_3, O_2, H_2O, O_3, N_2 and H_2.

16. A method of delivering precursor gas according to claim 11 further comprising providing a first precursor gas supply coupled to the first auxiliary chamber and a second precursor gas supply coupled to the second auxiliary chamber.

17. A method of delivering precursor gas according to claim 11 further comprising flowing first precursor gas from the first precursor gas supply to the first auxiliary chamber after closing the first precursor gas valve and flowing second precursor gas from the second precursor gas supply to the second auxiliary chamber after closing the second precursor gas valve.

18. A method of delivering precursor gas according to claim 11 wherein the first precursor gas comprises titaniumtetrachloride and the second precursor gas comprises ammonia.

19. A method of delivering precursor gas according to claim 16 wherein the first precursor gas supply comprises titaniumtetrachloride and the second precursor gas supply comprises ammonia.

20. A method of delivering precursor gas according to claim 13 wherein the inert gas is argon.